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(56) Documents Cited

GB 2049464 A

GB 0815349 A

US 5783078 A

US 3675776 A

US 3487932 A

(58) Field of Search

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INT CL⁷ F02M 37/22

Online: WPI, EPODOC, JAPIO

(54) Abstract Title

A fuel filter with suspended filter element

(57) A fuel filter comprises a filter element 34 suspended within a filter chamber 32 in a filter housing 30. The filter element has an upper cap member 36 and lower cap member 38. The filter housing comprises an upper lid member 30b and lower base member 30a. The filter element upper cap member 36 includes an annular lip 42 which is received between the lid and base member of the housing and is arranged so that the filter element is suspended within the filter chamber. The filter element comprises a mesh having a plurality of perforations which prevent the passage of large particles carried by the fluid flow. An annular seal 44 located between the base and lid member provides a fluid and air tight seal between internal chambers 32, 46 and between internal chambers and external environment. The filter may be used to filter diesel in an internal combustion engine. Water carried by the fuel is collected within the base region 33 of the filter housing. The filter element being suspended within the filter chamber eliminates the need for a spring or other support means within the filter chamber.

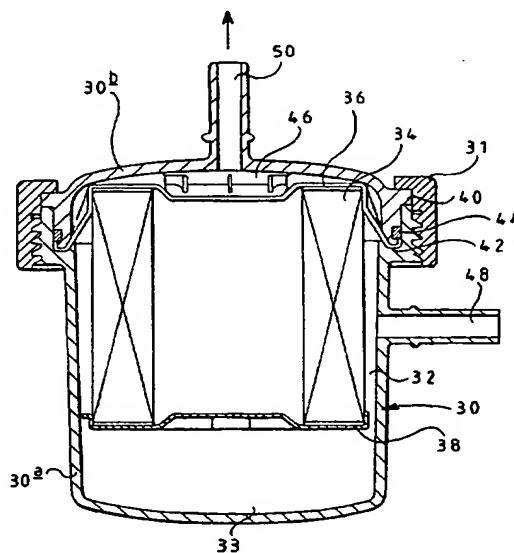


FIG 2

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

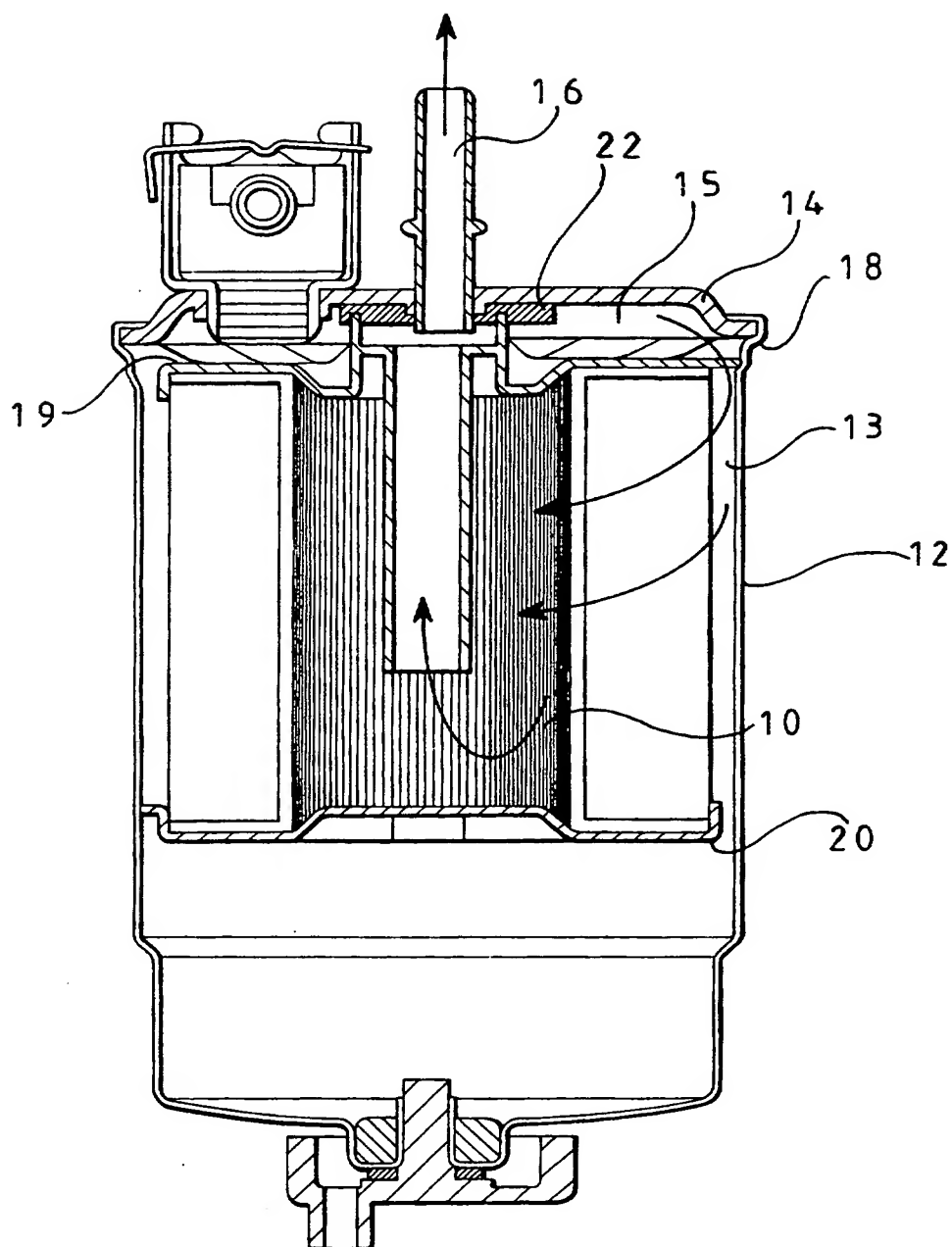


FIG 1
(Prior art)

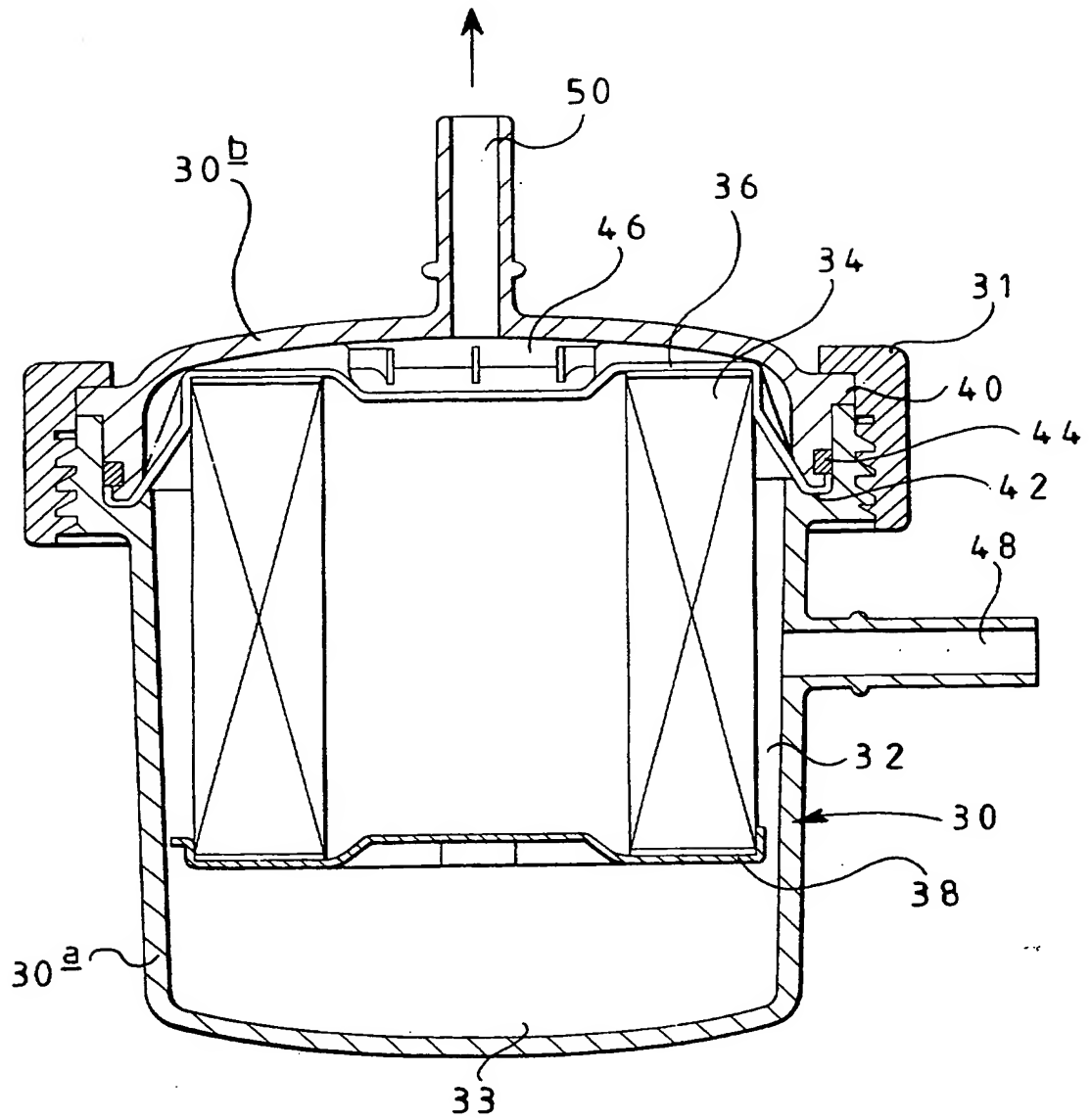


FIG 2

FUEL FILTER

The invention relates to a filter for use in filtering fuel, in particular, diesel, for an internal combustion engine.

It is usual to provide a filter in a fuel system for an internal combustion engine in order to remove contaminants from the fuel supplied to the engine. The provision of a filter prevents contaminants blocking small passages provided in, for example, the fuel injectors of the fuel system. It therefore prevents the efficient operation of the engine from being impeded.

Figure 1 is a cross-sectional view of a conventional fuel filter comprising a housing 12 which defines a filter chamber 13 within which a filter medium 10 is housed. The filter medium 10 takes the form of a mesh which has a plurality of perforations formed therein of sufficient size to permit fuel to flow therethrough, whilst preventing the passage of relatively large particles carried by the fuel flow. The housing 12 has an upper lid 14 which defines, in part, a chamber 15 into which fuel is delivered, in use. The upper lid 14 is provided with an aperture through which an outlet flow passage 16 extends. In use, fuel is delivered from the chamber 15 into the filter chamber 13 and flows through the filter medium 10, as indicated by the direction of the arrows. Filtered fuel is then discharged from the filter through the outlet passage 16. A seal member 18 is located between the upper lid 14 and the housing 12 to provide an air and fluid tight seal between the inside and the outside of the filter.

The filter medium 10 has upper and lower end caps, 19, 20 respectively, and is retained in position within the housing 12 by means of a compression spring (not shown) which is housed within the filter chamber 13, one end of the spring engaging the lower surface of the lower end cap 20 to urge the filter medium 10 upwardly against the seal member 22. The seal member 22 provides a seal between the clean and dirty sides of the filter. It is also known to provide alternative support means within the filter chamber 13, in place of the spring, to urge the filter medium 10 upwardly and to provide a seal at the seal member 22.

A disadvantage of this type of filter is that the seal member 22 may not provide a sufficient seal to prevent clean, filtered fuel which has passed through the filter medium 10 becoming contaminated by fuel within the chambers 13, 15 on the dirty side of the filter medium 10. In addition, fuel filters of this type can be costly to manufacture, in particular due to the requirement for a relatively large spring and the seal member 22.

It is an object of the present invention to provide a fuel filter which alleviates at least one of the disadvantages of conventional fuel filters.

According to the present invention, there is provided a fuel filter comprising a filter housing defining a filter chamber, a filter medium having a clean side and a dirty side, the filter medium being arranged such that, in use, fuel flows through the filter medium from the dirty side to the clean side, the filter medium having a cap member associated therewith, the cap member and the filter housing being arranged such that the filter medium is suspended within the filter chamber.

The invention provides the advantage that, as the filter medium is suspended within the filter chamber, the need for a spring or other support means within the filter chamber is removed. The number of filter components, and hence the cost of the filter, is therefore reduced.

Preferably, the filter medium has an upper cap member and a lower cap member. The filter housing may comprise a lid member and a base member, a part of the upper cap member being received between the lid member and the base member and being arranged such that the filter medium is suspended within the filter chamber. For example, the upper cap member may include an annular lip portion, the lip portion being received between the lid member and the base member.

The filter may further comprise a seal member arranged such that, in use, fuel on the dirty side of the filter medium is substantially isolated from filtered fuel on the clean side of the filter medium. The seal member may conveniently be located between the lid member and the base member of the filter housing, thereby providing a substantially fluid tight seal between a chamber defined, in part, by the lid member and a filter chamber defined, in part, by the base member.

As only a single seal member is required to form a substantially fluid and air tight seal (i) between the dirty side of the filter medium and the clean side of the filter medium and (ii) between the lid member and the base member of the filter housing, the number of filter components is further reduced. In addition, contamination of filtered fuel on the clean side of the filter medium by unfiltered fuel on the dirty side of the filter medium is less likely to occur.

The invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is a side view of a fuel filter which is known in the prior art; and

Figure 2 is a side view of a fuel filter in accordance with an embodiment of the present invention.

Referring to Figure 2, a fuel filter comprises a filter housing, referred to generally as 30, which defines a filter chamber 32 within which a filter medium 34 is housed. The filter medium 34 takes the form of a mesh having a plurality of perforations which are of a suitable dimension to permit fuel to flow therethrough, whilst preventing the passage of relatively large particles carried by the fuel flow. The filter housing 30 comprises a lower base member 30a and an upper lid member 30b, the lower base member 30a defining a base region 33 within which water carried by the fuel flow collects, in use. The base member 30a carries, at its uppermost end in the illustration shown, a screw thread formation which engages a corresponding screw thread formation provided on the innermost surface of a clamp member 31. The lid member 30b includes an annular projection 40, the annular projection 40 being clamped between the clamp member 31 and the base member 30a.

The filter medium 34 has upper and lower end cap members 36, 38, the upper cap member 36 including an annular lip 42 which is received between the lid member 30b and the base member 30a of the filter housing 30 and is held in place by means of the clamp member 31. The lid member 30b and

the upper cap member 36 together define a chamber 46 through which filtered fuel, which has passed through the filter medium 34, flows to an outlet passage 50. An annular seal member 44 is located between the base member 30a and the lid member 30b, the seal member 44 serving to provide a substantially fluid and air tight seal between the filter chamber 32 and the chamber 46, and between the chambers 32,46 and the external environment. The filter housing 30 therefore forms a substantially sealed unit.

In use, fuel is delivered to the filter through an inlet passage 48 which communicates with the filter chamber 32 through an aperture provided in the base member 30a of the filter housing 30. Fuel is able to flow through the perforations in the filter medium 34 whilst particles carried by the fuel flow are trapped by the filter medium 34. Filtered fuel flowing through the filter medium 34 is discharged from the filter through the outlet passage 50. Additionally, water carried by fuel flowing through the inlet passage 48 into the filter chamber 32 is collected within the base region 33 defined by the base member 30a of the filter housing 30.

As the upper cap member 36 of the filter medium 34 is held between the lid member 30b and the base member 30a of the filter housing 30, the filter medium 34 is suspended within the filter chamber 32. Thus, the need for a spring, or other support means, within the base member 30a of the filter housing 30 is removed. As the number of filter parts is reduced, the cost of the filter is therefore also reduced.

It will be appreciated that, in addition to providing a substantially fluid and air tight seal between the chamber 46 and the filter chamber 32, the seal

member 44 also provides a seal between the dirty side and the clean side of the filter medium 34. The seal member 44 therefore provides two functions and, thus, the need for an additional seal member is removed. The upper cap member 36 of the filter medium 34 also provides a means of separating the clean side and the dirty side of the filter medium 34. Contamination of clean, filtered fuel which has passed through the filter medium 34 is therefore less likely to occur due to the arrangement of the upper cap member 36 and the seal member 44.

It will be appreciated that, although the filter hereinbefore described is intended for use in filtering diesel in an internal combustion engine, the filter may also be used to filter other types of fluid.

CLAIMS:

1. A fuel filter comprising a filter housing defining a filter chamber, a filter medium having a clean side and a dirty side, the filter medium being arranged such that, in use, fuel flows through the filter medium from the dirty side to the clean side, the filter medium having a cap member associated therewith, the cap member and the filter housing being arranged such that the filter medium is suspended within the filter chamber.
2. A filter as claimed in Claim 1, wherein the filter medium has an upper cap member and a lower cap member.
3. A filter as claimed in Claim 2, wherein the filter housing comprises a lid member and a base member, a part of the upper cap member being received between the lid member and the base member and being arranged such that the filter medium is suspended within the filter chamber.
4. A filter as claimed in Claim 3, wherein the upper cap member includes an annular lip portion, the lip portion being received between the lid member and the base member.
5. A filter as claimed in any of Claims 1 to 4, further comprising a seal member arranged such that, in use, fuel on the dirty side of the filter medium is substantially isolated from filtered fuel on the clean side of the filter medium.

6. A filter as claimed in Claim 5, wherein the seal member is located between the lid member and the base member of the filter housing, thereby providing a substantially fluid tight seal between a chamber defined, in part, by the lid member and a filter chamber defined, in part, by the base member.

7. A filter substantially as described herein with reference to the accompanying Figure 2.



Application No: GB 0026409.3
Claims searched: 1 - 7

Examiner: Beverley Lloyd
Date of search: 27 March 2001

Patents Act 1977 Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.S): B1D (DNFD, DNFE, DNRE)

Int CI (Ed.7): F02M 37/22

Other: Online: WPI, EPODOC, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2049464 A (SPECIALISTS) See fig 1, page 1 lines 5 - 22	1
X	GB 0815349 A (AIR-MAZE) See fig 2	1
X	US 5783078 A (DANA) See fig 1, col 3 line 41, col 5 line 43	1 - 6
X	US 3675776 A (CAMPO) See fig 2,	1
X	US 3487932 A (FORRESTER) See fig 4, col 3 line 64, col 4 line 25 - 40	1 - 4

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.